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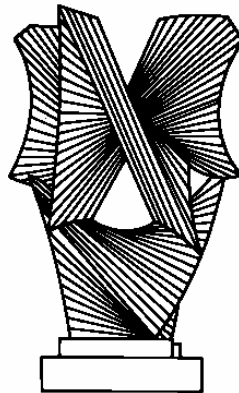
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AGGREGATING PROBABILITIES ACROSS OFFENCES IN CRIMINAL LAW

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THE LAW SCHOOL
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Aggregating Probabilities across Offences in Criminal Law

(First Draft – February 17, 2008)

Alon Harel & Ariel Porat*

A defendant is charged with four offences, allegedly committed in four different times and places. The probability that he committed each one of the offences is 90%. Assume that the minimum threshold required for conviction is 95%. Under prevailing criminal law the defendant would be acquitted of all four charges since no offence can be attributed to him. However, a simple calculation reveals that the probability that the defendant committed no offence at all is .01% only! Consequently it seems that convicting the person for at least one offence without specifying what this offence is would be just and efficient.

We argue that in such cases, and under certain conditions, efficient deterrence will be better achieved if courts would aggregate probabilities across different offences, and would be willing to convict defendants even for unspecified offences. We also show under what conditions aggregating probabilities will yield less, rather than more, convictions.

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Introduction

The question we address in this paper is whether when a defendant is accused of several offences, the court (or the jury) should examine each charge separately and decide whether the standard of "beyond reasonable doubt" was satisfied *with regard to each of them*, or instead examine all charges in aggregate and decide whether the standard of "beyond reasonable doubt" is satisfied with respect to *at least one* of them. We call the former principle: the "Distinct Probabilities Principle" (DPP) and the latter principle the "Aggregate Probabilities Principle" (APP). Example 1 illustrates the pros and cons of using the APP.

Example 1. Sexual Assault. A person is charged with four offences of sexual assault committed in different times and places against different women. The evidence suggests that the probability that the person committed each one of these offences is .9. There is no interdependence among the probabilities attached to the commission of each offence. Assume that the required probability necessary to satisfy the "beyond reasonable doubt" standard in our legal system is .95.¹ Should the court convict the defendant on any offence?

Examined separately, that is, in accordance with the DPP, the defendant ought to be acquitted of all four offences. Yet it is also easy to see that the probability that the person committed at least one of these offences is much higher than the probability necessary for conviction in a criminal trial! In fact that probability is .9999!² Furthermore the probability that he committed at least 2 offences is still higher than .95.³ Consequently, it does not seem unjust to follow the APP and convict

¹ This assumption does not require us to presuppose that the standard of "beyond reasonable doubt" is only probabilistic. We may assume that a certain amount of individualized evidence, relating to the defendant's conduct is a pre-requisite for conviction. For using the .95 threshold as an illustration of the probabilistic nature of the "beyond reasonable doubt" standard, *see* Kaye, at 40.

² Here is the calculation: the probability that the person committed each one of the offences is .9, and therefore the probability that he did not commit each one of them is $1-.9=.1$. Consequently the probability that he did not commit any offences is $(.1)^4=.0001$, and the probability that he committed at least one of the offences is $1-.0001=.9999$.

³ This is the outcome of a binomial distribution. There are 4 events, and in each one the defendant either committed the offence or not (thus he either committed 0, 1, 2, 3 or 4 offences, and the probability that one of these scenarios happened is 1). To calculate the probability that the defendant committed at least 2 offences out of the 4, the probability that he committed 0

him of two offences (or of at least one offence). Note that even if the defendant was charged with two instead of four offences, aggregating the probabilities would yield a probability of .99 that the defendant committed at least one offence, and applying the APP would guarantee conviction.

The dilemma faced by the legal system is straightforward. If the person in Example 1 is not convicted of any of the offences, it follows that he is acquitted despite the fact that the probability that he committed at least two offences is higher than the probability required for conviction. Individuals however are routinely convicted for committing single offences on the basis of much weaker evidence. Yet, at the same time, by using this probabilistic calculation and applying the APP, the person cannot be convicted of any *specific* offence. All the evidence establishes is that he committed "beyond reasonable doubt" at least two offences out of the four offences which he is being charged with. There is no evidence sufficient for conviction that any *particular* offence was committed by him. Is it just or efficient to acquit the person in such a case and, at the same time, convict another person who is charged with an identical single offence with a much lower probability of .95? Or should he instead be convicted of committing two offences (or one offence) despite the fact that the judge cannot specify what these offences are?

Example 1 illustrates how aggregating the probabilities of all charges (in accordance with the APP) results in more convictions than if each charge is examined separately (in accordance with the DPP). The next example illustrates how aggregating probabilities could result in fewer convictions.

offences or 1 offence should be subtracted from 1. Since the probability that the defendant did not commit any offence is $(.1)^4 = .0001$, and the probability that he committed exactly one offence is $(.9) * (.1)^3 * 4 = .0036$ ("9" is the probability that he committed one specific offence; $(.1)^3$ is the probability that he did not commit any of the other 3 offences; and the multiplication by "4" is because the specific offence committed by the defendant could be any of the 4 offences), the probability that he committed at least 2 offences is $1 - .0001 - .0036 = .9963$. To calculate the probability that the defendant committed at least 3 offences the probability that he committed 4 offences should be added to the probability that that he committed 3 offences. Since the probability that the defendant committed 4 offences is $(.9)^4$ and the probability that he committed 3 offences is $(.9)^3 * .1 * 4$, the probability that he committed at least 3 offences is $.6561 + .2916 = .9477$.

Example 2. Sexual Assault: Fewer convictions. A person is charged with four identical offences of sexual assault committed in different times and places against different women. The evidence provided to the court suggests that the probability that the person committed each one of these offences is .95. There is no interdependence between the probabilities attached to the commission of each offence. Assume that the required probability necessary to satisfy the "beyond reasonable doubt" standard in our legal system is 0.95. Should the court convict the defendant in all offences?

Examined separately, the defendant ought to be convicted of all four offences. Yet it is easy to see that the probability that the defendant committed *all* four offences is much lower than .95. In fact that probability is around .81!⁴ The judge in this case is faced therefore with a hard choice. If she convicts the person of three offences (without specifying what these offences are) the probability that the defendant committed three offences is higher than .95 (it is .986) and thus satisfies the evidential requirements of a criminal trial. At the same time the judge cannot specify what the offences the person is convicted of are. Instead, she simply asserts that the probability that the person committed three offences out of the four is high enough to justify conviction. But convicting the person of four offences would guarantee that the person is convicted for an offence where the likelihood he committed it is lower than .95. Convicting the person for the four offences would almost inevitably result in convicting him for an offence he has not committed.

Surprisingly, the possibility of applying the APP in criminal law across different offences is yet unexplored.⁵ Even more surprisingly, to the best of our

⁴ $(.95)^4 = .814$.

⁵ In other fields however the APP was considered and discussed at length. Thus, for instance, aggregating probabilities in *civil* cases, was suggested by legal writers. See, e.g., Saul Levmore, Michigan L. Rev.; Alex Stein Texas L. Rev. Furthermore, in an insightful paper published more than a decade ago, Frederick Schauer and Richard Zeckhauser proposed aggregating probabilities across cases outside the judicial context. See, e.g., Frederick Schauer and Richard Zeckhauser, Degree of Confidence for Adverse Decisions 25 Journal of Legal Studies 27, 41-51 (1996). The authors argued that if, for example, a school considers dismissing a teacher, it would make sense for the school to dismiss the teacher in case several complaints for sexual harassments were made against him in the past, even if each complaint, considered separately, does not provide sufficient reason for dismissal. The authors assumed, however, that such an argument is inapplicable to criminal proceedings. *Id.*, at 45-46 ("Of course, the practice of noncumulation of charges in the criminal law serves important goals... Obviously there are

knowledge, the APP has never been discussed in case law by judges and we do not know of any case where a prosecutor has argued in court for its implementation. It seems that lawyers as well as theorists take it for granted that a person can only be convicted for performing a particular identifiable crime.

In this paper we challenge this conventional wisdom and argue that using the APP in criminal proceedings may be justified under certain circumstances both for retributive justice considerations and for deterrence-based considerations. The focus of this paper is on the cases where applying the APP will result in more, rather than fewer, convictions. Our practical suggestion is that in such cases, as a first step, courts should apply the APP with special caution and to impose limits aimed to guarantee that it would not be abused.

The paper is organized as follows. *Part I* introduces the APP and the virtues and vices of using it. In *Part II* we distinguish the APP from previous doctrines concerning probabilistic issues in both criminal and tort law as well as from similar doctrines recognized by legal theorists and practitioners. *Part III* considers the APP from a deterrence-based perspective and indicates its potential of reducing the level of error in fact-finding as well as reducing enforcement costs. *Part IV* discusses several practical objections to the APP, the most important of which is its possible abuse by the enforcement agencies (police and prosecution). This part shows that none of the objections is compelling enough to justify the rejection of the APP altogether although some of these objections justify greater caution in applying it. In *Part V* we discuss the APP from a justice-based perspective. We establish that while retributivists may be inclined to inflict sanctions for *an* offence committed by a person irrespective of what this offence is (and consequently adopt the APP) expressivists may insist that the infliction of sanctions may be justified only if it is established that a person committed a *specific well-defined* offence (and consequently adopt the DPP).

I Introducing the Aggregate Probabilities Principle

The evidence required for convicting a person in a criminal trial must be evidence which is "beyond reasonable doubt." The rationale of this requirement and

costs associated with theses goals... but weighing the costs and benefits of the refusal to cumulate in the criminal process is not our goal").

its precise meaning is of course controversial.⁶ Yet it is beyond doubt that the standard of "beyond reasonable doubt" has an important probabilistic aspect to it.⁷ The

⁶ See, e.g., Lawrence M. Solan, *Refocusing the Burden of Proof in Criminal Cases: Some Doubt about Reasonable Doubt*, 78 Texas L. Rev. (2000) ("Most debate in judicial opinions and in the scholarly literature has focused on whether reasonable doubt should be defined for the jury, and, if so, how it should be defined."); Note, *Reasonable Doubt: An Argument Against Definition*, 108 Harvard L. Rev. (1995) (concluding that "courts should not attempt to define the term [reasonable doubt] in conveying the reasonable doubt concept to juries"); Jessica N. Cohen, *The Reasonable Doubt Jury Instruction: Giving Meaning to a Critical Concept*, 22 American Journal of Criminal Law 677, 678 (1995) (arguing that "because reasonable doubt is a term of art it should be defined for the jury"); Henry A. Diamond, Note, *Reasonable Doubt: To Define, or Not to Define*, 90 Columbia L. Rev. 1716 (1990) ("[J]ury instructions defining reasonable doubt should always be given in criminal trials and are constitutionally required when requested by the defendant or the jury."). See also Thomas V. Mulrine, *Reasonable Doubt: How in the World is it Defined?*, 12 American University Journal of International Law and Policy (1997) (explaining various approaches to and definitions of reasonable doubt).

⁷ Alex Stein, *** 65 ("Adjudicative fact-finding rests on probabilistic reasoning that derives from experience"), and at 66, "Any finding that fact-finders make can only be probable, rather than certain"). For the different views, see *** Kaye, *The Laws of Probability and the Law of the Land*, 47 UNIVERSITY OF CHICAGO L. REV. 34, *** (1980) ("Physicists, engineers, economists, geneticists, businessmen, actuaries, bookmakers, and casino operators prove, day in and day out, that the mathematical theory provides more useful and more accurate predictions of important phenomena than any alternative methods. Surely the probability axioms work sufficiently well for objectively estimated probabilities. Why should they not serve as well when applied to thoughtful, subjective estimates?"); *** Nesson, *Reasonable Doubt and Permissive Inferences: The Value of Complexity*, 92 Harvard L. Rev. 1187, *** (1979) (concluding that "any conceptualization of reasonable doubt in probabilistic form is inconsistent with the functional role the concept is designed to play."); *** Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 84 Harvard L. Rev. 489, *** (1970) (offering a variety of practical reasons to suggest that probabilities calculated according to Bayes's statistical formula would not be as accurate or useful as they might appear at first sight, and pointing out how values other than the accuracy of fact-finding might be undermined by the explicit use of probability calculations, especially in criminal cases; Jonathan J. Koehler & Daniel N. Shaviro, *Verdical Verdicts: Increasing Verdict Accuracy Through the Use of Overtly Probabilistic Evidence and Methods*, 75 Cornell L. Rev. 247, 252 (1990) ("All evidence is probabilistic, in the sense that there is a risk of error in relying on it to support a factual conclusion about a case"); Jonathan Cohen (***).

evidence supporting a conviction in a criminal trial ought to establish that the defendant committed an offence with a high degree of probability.⁸

It is implicitly assumed by the criminal law system that in order to convict a person for the commission of an offence, the standard of "beyond reasonable doubt" should be satisfied *with respect to each offence*, that is., separately and distinctively from other offences.⁹ To the best of our knowledge no one has ever doubted this principle, which we label the Distinct Probabilistic Principle (DPP). The proposed principle we offer in this paper—the Aggregate Probabilities Principle (APP)—challenges the DPP: why not convict a person for *an* offence when it is certain, or almost certain, that that person committed an offence, even if it cannot be established which offence it was. Why not convict the defendant in Example 1 for at least one offence of sexual assault when the probability that he committed no offence at all is *one to ten thousand*? To reduce the risk of excessive punishment, a supporter of the APP would argue, the defendant in example 1 should be convicted at a minimum for the least serious of the four offences, and be punished accordingly.

Note that the APP works not only against defendants but also in their favor. Example 2 is illustrative: a defendant who is accused of four offences of sexual assault where each—if examined separately—can be proven beyond reasonable doubt should not be convicted under the APP for all four offences, but only for three.¹⁰

⁸ For those readers who are skeptical about mathematical calculations in the legal context we suggest to think of the same problem without resorting to probabilities: should a court convict a defendant when there is no reasonable doubt that he committed at least one offence, but it cannot be established which offence out of several offences was committed by him? See Jonathan Cohen (***); Tribe (***).

⁹ The prior acts doctrine could be regarded as an exception, but as will be explained *infra*, this doctrine is completely different from the APP. In particular, under the prior acts doctrine, the prior acts of the defendant indicate that the probability that he committed the offence he is charged with is higher than what the court would have determined absent the prior acts doctrine. In contrast, under the APP, once the probabilities of the commission of several offences are established, those probabilities are aggregated and may lead to conviction for an offence which is unspecified.

The other exception is the German legal system which recognizes under certain circumstances that a person can be convicted of an unspecified offence. Yet this exception is much narrower in its scope than the rule proposed by us. For a description of the German system, see

¹⁰ This is not to say, however, that the APP is overall neutral with respect to defendants. Admittedly, the APP is expected to bring to more convictions than to more acquittals. The

In theory the APP could be applied to any case where a defendant is charged with more than one offence. We draw now some intuitive distinctions between different cases and in the following parts we return to these distinctions and show how they may have normative significance in shaping the APP.

First it is intuitive to distinguish cases in which a person is charged with identical offences from cases in which a person is charged with different offences (*"the nature of the offence criterion"*). As we demonstrate later on, expressivist theorists of punishment would find it more acceptable to convict a person for sexual assault when there are four charges against him on that matter even if none of the charges, examined separately, can be proven beyond reasonable doubt. Those theorists would find it much harder to convict a person who committed either theft, or fraud or murder when none of these offences can be proven beyond reasonable doubt even if it is evident that the person committed one of these offences.

Second, even if the offences are identical, it would be easier to accept a conviction of a person of what we label *"homogenous offences,"* namely offences whose nature and severity depends less on the particular circumstances than to accept a conviction of a person of *"heterogeneous offences"* (*"the homogeneity criterion"*). The severity of theft or fraud may depend on numerous contextual considerations, while violating the speed limit is typically less sensitive to the circumstances.

Third, in some cases the relevant offenses are directed at the same victim, while, in other cases, the offenses are directed at different victims (*"the same victim criterion"*). Thus, there could be a difference between applying the APP to a case when an employer is accused of four acts of sexual assault directed towards a specific employee, and applying it to a case when a defendant is accused of four such acts directed towards different victims. This difference could cut both ways: on one hand it could be more acceptable to convict a person for an unspecified offence if it can be proven beyond reasonable doubt that the offence was committed against a single victim than if the offence was committed against different victims. Some of the

intuition for this is that the APP, by taking into account all probabilities from 1% to 94% (assuming 95% is the threshold for conviction) increases the number of convictions, and only by taking into account probabilities from 95% to 99% reduces the number of convictions. This asymmetry by itself can explain why the APP is expected to bring in total to many more convictions than what we presently have under the DPP. Later we offer more reasons that reinforces this conclusion. *Infra*.

retributive and communicative theories are expected to support such an argument. On the other hand, when the victim of all offences is the same one, the risk that the offences are interdependent is higher. As we elaborate further on, interdependency could be a significant obstacle for the application of the APP.

Fourth, when we move from the core offences of criminal law to regulatory violations, the use of the APP seems more reasonable. Thus, being detected four times for driving beyond the speed limit by a police radar seems to pose a stronger case for applying the APP than committing four thefts. Besides typically satisfying the homogeneity criterion, traffic offences are regulatory offences. Regulatory offences are governed primarily by considerations of deterrence and justice-based considerations are less applicable with respect to them (*"the regulatory offence criterion"*).

Fifth, there is an intuitive difference between a case when a person is charged with all offences simultaneously and a case when a person is charged with a new offence after he had been previously convicted or acquitted of previous offences (*"the same trial criterion"*). Compare example 1, where a person is charged simultaneously with four offences and the evidence suggests that the probability that he committed each of these offences is .9, with a case in which a person has been acquitted three times in the past because the probability that he committed one of these past offences is merely .9. Similarly compare example 2 where a person is charged with four offences each of which can be proven with a probability of .95 with a case in which a person was convicted three times in the past because the evidence indicated with a probability of .95 in each case that he had committed the offence. The reasoning of the judge in the fourth case could either adopt the DPP or the APP. Somewhat counter-intuitively, applying the APP yields higher chances of conviction for a person who was acquitted in the past and lower chances of conviction for a person who was convicted in the past. Yet the case for applying the APP for different trials, rather than for different charges in the same trial, seems to be weaker.¹¹

¹¹ The case for applying the APP in different trials is weaker for several reasons: first, the information obstacles in applying the APP across trials are more serious than across charges in the same trial. Second it seems to violate the implicit principles that trials are separate and that the outcome of one trial ought not to influence the outcome of other trials for other offences.

Finally, The APP is not limited to cases when the product of the aggregated probabilities is less than 100%: it also could apply to cases when there is no doubt whatsoever that the defendant committed an offence, even though it cannot be established which offence it was. An example given by Leo Katz is illustrative. Suppose a murder and a burglary were committed at the same time in two different places and a hidden camera recorded both events. Unfortunately the perpetrators of these crimes are twin brothers. It is known therefore that each of the two brothers committed one of the offences. It is unknown however which was committed by whom.¹² Under the APP both brothers should be convicted for the lesser of the two crimes, namely burglary.

II The Aggregate Probabilities Principle in Context

A. Aggregating Probabilities in Prevailing Law

Aggregating probabilities is not unfamiliar to the legal system. The question of aggregating probabilities manifests itself in fact-finding procedures when a court or a jury must determine whether a conjunction of facts or events took place. With respect to each of the facts or events composing the set there is a specific probability that it took place, and the probability that *all* facts or events, or alternatively, at least one of them, took place is an aggregation of all relevant probabilities. Thus, suppose a judge in a civil case must decide whether the defendant was negligent and whether he caused the injury, and, only if both questions are answered affirmatively is liability imposed. Assume now that the judge estimates that the probability that the defendant's was negligent is .6, and the probability that given his negligence he caused the injury, is also .6. Aggregating the probabilities in this case yields a probability of .36 that the defendant was both negligent *and* caused the injury (hereinafter: "the civil cumulative case"). If the decision is based on aggregating the different probabilities of the two components of the wrongdoing, the plaintiff should lose since the probability that both components were satisfied is only .36. However, if each component of the cause of action—negligence and causation—is examined separately, the plaintiff would win

¹² Leo Katz, *Ill-Gotten Gains: evasion, blackmail, fraud, and kindred puzzles of the law*, 67-69.

the case. Theorists disagree whether an aggregation of probabilities rule should be applied and it seems that case law rejects it.¹³

Similarly, when the defendant is liable either if scenario A took place *or* if scenario B took place (for example, each scenario establishes that the defendant both was negligent toward the victim and caused him the injury), the probability with respect to each scenario is .3 and those probabilities are independent of each other, then the probability that at least one of the scenarios took place is .51 (hereinafter, "the civil alternative case").¹⁴ Once again, aggregating the probabilities would

¹³ See Saul Levmore, *Conjunctions and Aggregation*, 99 MICHIGAN L. REV. 723 (2000-1) (Arguing that no jurisdiction explicitly recognizes the product rule—which is the rule that mandates the aggregation of the probabilities (*id.* at 752, note 58); and explaining that such non-recognition could be warranted mainly in those cases where decisions are made by both jury or other multimember panels, either unanimously or by supermajority).

Some theorists argue that not allowing the product rule creates "the conjunction paradox": See Stein, *Of Two Wrongs That Make a Right: Two Paradoxes of the Evidence Law and Their Combined Economic Justification*, 79 TEXAS L. REVIEW 1203-1205 (2001) (***). Allowing the product rule is supported by Maya Bar-Hillel, *Probabilistic Analysis in Legal Factfinding*, 56 ACTA PSYCHOLOGIA 267 (1984); David Kaye, *The Laws of Probability and the Law of the Land*, 47 UNIVERSITY OF CHICAGO L. REV. 34 (1979); Bernard Robertson & G.A. Vignaux, *Probability – The Logic of the Law*, 13 OXFORD J. LEGAL STUDIES 457 (1993). Disallowing it is supported by Ferdinand Schoeman, *Cohen on Inductive Probability and the Law of Evidence*, 54 PHI. SCI. 76, 80-82 (1998). Stein, *id.*, identifies the distortion that could be created by disallowing the product rule if examined separately, but argues that taken together with another major distortion in fact-finding, a second best solution is achieved.

See also Barbara White, *Coase and the Courts: Economics for the Common Man*, 72 Iowa L. Rev. 577 (1987). For the different views see George Bundy Smith & Janet A. Gordon, *The Admission of DNA Evidence in State and Federal Courts*, 65 Fordham L. Rev. 2465 (1997) (saying "[T]he preferred method for estimating the probability of matching bands in a random sample of DNA profiling is referred to as the 'product rule' method", at 2474); Sue Rosenthal, *My Brother's Keeper: A Challenge to the Probative Value of DNA Fingerprinting*, 23 American Journal of Criminal Law 195 (1996), at 200.

¹⁴ The probability that none of the events took place is $.7 \times .7 = .49$. The probability that *at least* one of them took place is $1 - .49 = .51$. If the scenarios exclude each other then the probability that at least one took place is $.3 + .3 = .6$. For an analogical example see Stein, *supra* note, at 85, (discussing "The Two Witnesses Paradox" according to which two unreliable witnesses—namely, each testimony is assumed to have less than .5 probability of being true—are brought by the claimant and gives identical testimonial accounts, independently of each other. Since

generate a different decision than if each probability were to be considered separately.¹⁵ Generally, also here, courts do not explicitly recognize the aggregation of the probabilities rule.¹⁶ However, there are important exceptions to this general rule. In tort, for instance, proving by the preponderance of the evidence that the defendant's wrongful act caused the injury would normally be sufficient for courts to impose liability, even if the plaintiff cannot prove by the preponderance of the evidence what *exactly* made the defendant's act wrongful.¹⁷

Finally, aggregating probabilities can also be relevant to criminal cases. When establishing the defendant's guilt requires the presence of several components of the offense, aggregating the probabilities of the separate components is important. It can be the case that even if *each* component of the offense can be proven beyond a reasonable doubt there would be a reasonable doubt with respect to the cumulative existence of *all* components (hereinafter, "the criminal cumulative case"). Will the court convict the defendant under such circumstances? The answer to this question is unclear.¹⁸

both witnesses are unreliable, their independent corroboration lowers, rather than increase the probability that the claimant's claim is founded).

¹⁵ See Levmore, *supra* note, at 729, note 11, and 745-6 (explaining this "alternative Routes" scenario, and titling this issue "reverse conjunction"). Levmore applies his explanation for the non recognition of the product rule, *supra* note, also to this scenario. Levmore, *Id.*

¹⁶ Levmore, *supra* note, at 729, note 11; Tribe, *supra* note, at 1361, claims that hard statistical data leads decisionmakers to "dwarf the soft variables" and to assume that "[i]f you can't count it, it doesn't exist" (for different view see Koehler & Shviro, *supra* note, at 265).

¹⁷ Cite. Check: Prosser, Torts; Dobbs, Torts; Restatement 2d, Torts; and Draft of Restatement 3d, Torts.

18 See Levmore, at 729 (presenting a possible application of the product rule to criminal cases) and 733, note 19 (suggesting that the defense might enjoy the product rule when it reminds the jury of all the doubts that have been raised and imply that they combine to leave more than a reasonable doubt). See also Jonathan Remy Nash, *A Context-Sensitive Voting Protocol Paradigm for Multimembers Courts*, 56 STAN. L. REV. 75, 138 (discussing the product rule in the context of voting by judges in a panel or by jurors and observing that "Although a criminal defendant cannot be convicted unless a jury unanimously finds each element of the crime charged proven beyond a reasonable doubt, 'a federal jury need not always decide unanimously which of several possible sets of underlying brute facts make up a particular element, say, which of several possible means the defendant used to commit an element of the crime.'" (footnotes omitted)).

The case discussed in this paper is different from both the civil and criminal cumulative cases. These cases deal with the question of when a court ought to convict a person for a particular specified offence or to impose liability for a particular specified wrong. The aggregation of the probabilities is designed to determine whether a person committed the offence or the wrong. If the court imposes liability on the defendant or convicts him, it implies that the court is satisfied that the evidence is sufficient to justify the imposition of liability for a *particular* act. If the court fails to impose liability, it implies that the court is not satisfied that the evidence is sufficient to justify the imposition of liability for a *particular* wrong or for conviction in a *particular* offence. In contrast, the concern of this paper is to examine cases in which no specific offence can be attributed to the defendant. It is evident (or at least sufficiently probable) that the defendant committed an offence (or several offences) but it is unclear what this offence is.

The civil alternative case discussed above is more relevant to our inquiry. In both the civil alternative case and in our case aggregating the probabilities and basing liability (or guilt) on such aggregation results in the imposition of liability on a person even if it cannot be established (under the relevant standard of proof) what the misdeed he committed was. In tort, not knowing what exactly *all* the detailed facts concerning the wrongful act are does not preclude the attribution of liability. Thus if a car hits a pedestrian and all or most possible explanations for the accident indicate that the driver's fault was the cause of the accident, liability will be imposed regardless of whether we know what the fault of the driver was.¹⁹ But those cases are different than the criminal cases we focus on in this paper: while in the latter cases the indeterminacy relates to completely different misdeeds, in the former cases the indeterminacy relates to different components of the same misdeed.

A tort law doctrine which comes closest to the APP is the doctrine of market share liability (MSL). This doctrine was applied by some courts to the DES cases. DES, a drug designed to prevent miscarriages, was manufactured by hundreds of companies mainly in the fifties, turned out to be latently carcinogenic to female fetuses. Twenty-five years later, many of the women whose mothers took the drug have been diagnosed with uterine cancer. It was established by the court that the drug was not tested properly prior to its marketing and that the manufacturers failed to take

¹⁹ Cite cases.

into account certain findings that had pointed to the risk of cancer. Furthermore, the plaintiffs' mothers were never cautioned against this potential risk. Finally, the drug was marketed under its generic rather than brand name, which has foiled the attempt to trace each pill back to its actual manufacturer.²⁰ Unfortunately, most of the plaintiffs could not link the specific pills their mothers took to a specific manufacturer. To provide a remedy to the victims, the courts developed the MSL doctrine. Under this doctrine, first adopted by the Supreme Court of California at the *Sindell* Case,²¹ each of the defendants would be held liable for the plaintiff's damage unless each successfully proves that he did not manufacture the drug taken by the plaintiff's mother. As further clarified by the court in *Sindell*, this liability would be imposed only on those manufacturers who produced a substantial proportion of the DES drugs in the relevant market. The *Sindell* court ultimately decided that the burden of compensating each plaintiff for her damage would be allocated between the manufacturers in accordance with their respective shares in the DES market.²²

This is a doctrine which allows the aggregation of probabilities. To establish why, imagine that there are ten manufacturers in the market which wrongfully (but separately) produced and marketed an identical hazardous product (like the DES) to consumers thereby causing identical injuries to a thousand people. Also assume that all manufacturers have identical shares in the market and that it is completely impossible to trace any injury to any specific manufacturer. In a single case brought by one plaintiff, the probability that any single manufacturer caused the injury is 10%, which is much below the threshold required for imposing liability. However, the probability that a single manufacturer caused at least 10% of the total harm, namely the sum of harms caused to all victims, is very high, more than enough to justify the

²⁰ See *Sindell v. Abbott*, 607 P.2d 924 (Cal. 1980).

²¹ *Sindell v. Abbott*; *Collins*; *Martin v. Abbott Laboratories*, 689 P.2d 368 (Wash. 1984); *Hymovitz v. Eli Lilly Co.*, 539 N.E. 2d 1069 (N.Y. 1989). On the adoption of MSL in the Netherlands, see J.G. Teulings, *D.E.S. and Market Share Liability in the Netherlands*, 110 L.Q.R. 228 (1994). On the rejection of the MSL in Ohio law, see *Kurcz v. Eli Lilly & Co.*, 113 F. 3d 1426 (6th Cir. 1997).

²² It is not clear whether this decision should be interpreted as imposing liability on each defendant for all the plaintiff's damage (and then the allocation is achieved through indemnification claims between the co-defendants) or as imposing liability on each defendant only for part of the damage. For the second interpretation, see California in *Brown v. Superior Court*, 751 P.2d 470, 485-87 (Cal. 1988).

and unsurprisingly the main support for the MSL comes from the concern to provide potential tortfeasors with efficient incentives.²⁵ Deterrence is believed to be an important goal of criminal law; yet, unlike tort law, retributive considerations also play a central role in this field.²⁶ That could explain why aggregating probabilities could be more compelling in tort law than in criminal law. We will discuss both retribution and deterrence in section III and IV.

B. Similar Doctrines and Arguments

1. Prior Acts and Similar Crimes Doctrines

The APP maintains a close relationship to the "Prior Acts" and "Similar Crimes" doctrines. Under the *Prior Acts doctrine* which was adopted by rule 404(b) of the Federal Rule of Evidence,²⁷ the prosecution can bring evidence of past crimes or bad acts that can be attributed to the defendant in order to prove a narrow point relating to the defendant's mental state, such as motive, opportunity, intent, preparation, plan, knowledge, identity, or absence of mistake or accident. This evidence should not be used for proving the defendant's bad character, and courts are required to instruct the jury accordingly.²⁸

²⁵ Porat & Stein, at 130-159. See also Mark A. Giestfeld, *The Doctrinal Unity of Alternative Liability and Market-Share Liability*, 155 U. Pa. L. Rev. 447, 481 (2007) (explaining that "[u]nder this method of apportionment, the interest of the DES plaintiff who has established a right to receive compensation for the injury from the group of defendants exactly corresponds to the interest of each individual defendant as a member of the causal group",).

²⁶ For a different view see Ronen Perry, *The Role of Retributive Justice in the Common Law of Torts: A Descriptive Theory*, 73 Tenn. L. Rev. 177 (2006) (arguing that retributive justice has a certain influence on the development of tort law doctrines).

²⁷ Rule 404(b) prescribes: "evidence of other crimes, wrongs, or acts is not admissible to prove the character of a person in order to show action in conformity therewith. It may, however, be admissible for other purposes, such as proof of motive, opportunity, intent, preparation, plan, knowledge, identity, or absence of mistake or accident, provided that upon request by the accused, the prosecution in a criminal case shall provide reasonable notice in advance of trial, or during trial if the court excuses pretrial notice on good cause shown, of the general nature of any such evidence it intends to introduce at trial." Check *Woods*, that was decided before the enactment of 404 (B).

²⁸ See also *People v. Quinn*, 194 Mich. App. 250, 486 N.W.2d 139 (1992) (chastising prosecution for arguing propensity based on evidence admitted under Rule 404(b)).

The Similar Crimes doctrine, recognized by rules 413 and 414 of the Federal Rules of Evidence, applies to offences of sexual assault and child molestation. Under this doctrine, if the defendant is accused of an offence of sexual assault or child molestation, "evidence of the defendant's commission of another offence or offences of sexual assault or child molestation is admissible, and may be considered for its bearing on any other matter to which it is relevant."²⁹

The similarity between those two doctrines on the one hand and the APP on the other hand, emanates from a characteristic they have in common: all three doctrines look at the past behavior of the defendant and that behavior influences the chances of conviction.³⁰

But there is a substantial difference between the APP and the other two doctrines. The Prior Acts and Similar Crimes doctrines are founded on the conjecture that a person who had committed several offences is either more likely to intend to commit the offence he is presently accused of (the Prior Acts Doctrine) or is more likely to have committed that present offence (the Similar Crimes Doctrine). It is the interdependence between the other offence and the present offence attributed to the defendant which justifies the doctrines. In contrast the APP is founded on the assumption that there is no such interdependence between the different offences. It is based on the conjecture that when there is a specific probability that a person committed offence A and a certain probability that he committed offence B, and those

A federal court asked to admit other bad acts under Rule 404(b) need not make a preliminary finding that the defendant committed these acts. The court need only determine that there is sufficient evidence to support a finding by the jury that the defendant committed the act proffered under Rule 404(b). *See Huddleston v. United States*, 485 U.S. 681 (1988)). Evidence of other crimes is usually proffered in criminal procedures. Rule 404(b), however, contains no such limitation, and potential civil applications occasionally arise. *See Barnes v. City of Cincinnati* 401 F.3d 729 (6th Circ. 2005).

²⁹ Under Rule 415 of the Federal Rule of Evidence, this doctrine is applicable also to civil cases dealing with sexual assault and child molestation. For a critique of these rules, see Louis M. Natali Jr. & R. Stephen Stigall, *"Are You Going to Arraign His Whole Life?": How Sexual Propensity Evidence Violates the Due Process Clause*, 28 LOY. U. CHI. L. J. 1 (1996) ("by requiring the admission of propensity evidence, the rules prevent a fundamentally fair trial, and thus violate due process...").

³⁰ As Example 2 shows, sometimes the APP decreases chances of conviction. That could happen also with the Prior Acts and Similar Crimes Doctrine.

probabilities are not interdependent (or at least not fully interdependent), the probability that he committed at least one of the offences is higher than the probability that he committed A or the probability that he committed B.

Note, that under the Prior Acts and Similar Crimes doctrines the fact that a person committed several similar offences in the past increases the chances that he will be convicted in the present case. In contrast under the APP, as Example 2 illustrates, the fact that a person was convicted in committing several offences in the past decreases the probability that he will be convicted in a later case. Unlike the Prior Acts and Similar Crimes doctrines the APP dictates that the more a person was convicted in the past, the higher the threshold required for a future conviction, and vice versa.

2. Bentham's Proposal

The APP could be regarded as a variation on the famous Bentham's argument that the lower the probability of detection is, the higher the sanction ought to be.³¹ When detection is low, one of two routes should arguably be taken: either increasing the sanction or reducing the threshold for conviction. The APP takes the latter route while Bentham takes the former one.

In *The Principles of Morals and Legislation*, Jeremy Bentham argued that when there is a suspicion that the *same* convicted person escaped detection by the law in the past, the sanction should reflect this concern.³² Bentham maintains that in setting the punishment, "it may be necessary, in some cases to take into account the profit not only of the *individual* offence to which the punishment is to be annexed, but also of such *other* offences of the *same sort* as the offender is likely to have already committed without detection."³³

One way to interpret Bentham's argument is analogous to the way we understand the Prior Acts and Similar Crimes doctrine: while in the latter doctrine the court infers from past behavior *forward* to the present charge, Bentham encourages courts to infer from the present charge *backward* to past behavior. Under this interpretation of Bentham's argument, increasing punishment for the present charge is

³¹ For the modern version of the argument, see Gary Becker, *Crime and Punishment: An Economic Approach*, 76 Journal of Political Economy (1968), at 169.

³² We thank Avraham Tabbach for referring us to Bentham's on that issue.

³³ At p. 183.

aimed at punishing the convicted person for past behavior which, in light of the present conviction, can more easily be attributed to him.

Indeed, the APP, as Bentham's proposal indicates, is motivated by under-enforcement of the law: if there had been no under-enforcement and it had been always possible to fully and accurately detect all criminals, the APP would have been meaningless. But as has already been explained the APP is based on the conjecture of independence of the relevant probabilities while Bentham's suggestion is founded on the precise opposite assumption, namely the assumption that if the person committed one offence, it is more likely he has committed in the past other offences.

III The Case for the APP

Adopting the APP is expected to increase the number of errors in convicting the innocent (false negative, or Type 2 errors) and decrease the number of errors in acquitting the guilty (false positive, or Type 1 errors).³⁴ It is beyond the scope of this paper to examine the optimal allocation of errors in criminal cases.³⁵ So let us assume here, as we did before, that the "beyond reasonable doubt" standard implies a probability threshold of .95 for conviction. Under this assumption the law prefers having 18 guilty people—but not 19—set free than one innocent sit in jail.

Suppose now that we have a person accused of four identical offences, each with probability of .9 for that person's guilt (see Example 1). Maintaining the same threshold of 0.95 would mandate convicting the person with two offences in our example. If the legal system acquits the person of all offences, it seems to endorse a

³⁴ Type I error, or a false positive, is the risk that a study will reject the null hypothesis when it is true; it is the risk that the study will reject a lack of association when in fact there is no correlation. Type II, or a false negative, is the risk of failing to reject the null hypothesis when it is false; it is the risk that the study will declare no association when there is an association. All else being equal, one cannot decrease the risk of Type I error without simultaneously increasing the risk of Type II error. Cf. Robert Cooter and Thomas Ulen, *LAW AND ECONOMICS* *** (2007) (***).

³⁵ For different ways to optimize type I and type II errors in law enforcement, see Polinsky and Shavell, *HANDBOOK OF LAW AND ECONOMICS*, Volume I, 427-9; I. P. L. Png, *Optimal Subsidies and Damages in the Presence of Judicial Error*, 6 *INTERNATIONAL REVIEW OF LAW AND ECONOMICS* 101-105 (1986). For allocating the risks of errors by the law of evidence, see Stein, *supra* note, at ***.

principle under which it is better to have 9,999 guilty people acquitted than having one innocent person convicted. To better understand the absurdity of this result, imagine now that instead of four offences, the defendant in Example 1 was charged with ten offences, all with probability of .9 to his guilt. Not convicting the defendant in such a case of any offence would indicate a preference that *10 billion minus one* guilty people be acquitted in order to prevent the conviction of a single innocent person.³⁶ Besides of its absurdity, this result highlights the discriminatory effect of the DPP as opposed to the APP: adhering to the DPP implies an unfair preference of people accused of committing a series of offences as opposed to those accused of a single offence. This is so, because the probability of guilt required to convict a person of the former type is much higher than the probability of guilt required for convicting a person of the latter type.

As we stated at the beginning of this section, the APP is expected to raise the number of errors in convicting the innocent. But interestingly, under certain realistic assumptions about the limits of resources allocated to law enforcement, it is possible that the *costs* (as opposed to the number of errors) resulting from convicting the innocent would be lower under the APP than under the DPP. Suppose there is a constraint on the total amount of punishment the state can inflict on offenders, for example, on the total number of years *all* offenders are sent to prison. Under such a constraint, since the APP will result in more convictions, the average offender will be sent to jail for shorter periods of time. But note that under such a constraint, offenders who are charged with several offences will get on average more years in prison than what they get now, and other offenders, namely those who are charged with one offence, will get on average fewer years in prison than what they get now. If the probability of error in finding guilt with respect to defendants of the former category is lower than with respect to defendants of the latter category—which is very likely—and since the costs of error in convicting the innocent is also a function of the years the innocent is sent to jail, the shift from APP to ADD *could* decrease the total costs of convicting the innocent.³⁷

³⁶ The probability that no offence was committed is $(.1)^{10}$, and consequently the probability that at least one offence was committed is $1-(.1)^{10}$.

³⁷ Cf. Talia Fischer *** (arguing that sanction should be correlated with the probability of guilt, and pointing out that among other things adopting such rule could reduce the costs of convicting

Most importantly, the APP is superior to the DPP on deterrence-based grounds. In particular, the DPP has a negative effect on the deterrence of repeat offenders. Under the DPP, repeat offenders' chances to escape conviction are much higher than under the APP. This implies that their expected sanction under the DPP is lower than under the APP and therefore there is greater deterrence under the latter rule. Since there is almost a consensus among writers that the expected sanction necessary to achieve optimal deterrence is higher for repeat offenders than for other offenders,³⁸ the APP is well founded on deterrence grounds.

the innocent); Henrik Lando, *The Size of the Sanction Should Depend on the Weight of the Evidence*, 1 REVIEW OF LAW AND ECONOMICS 278 (2005) (suggesting to vary sanctions with the weight of evidence, and pointing out that this results in less unfairness to the innocents who are wrongly convicted).

Our argument is analogical to a different argument made by theoreticians according to which it is justified to punish repeat offenders more severely than other offenders, because the risk of convicting the innocent is lower with repeat offenders than with other offenders. See C.Y. Cyrus Chu, Sheng-cheng Hu, Ting-yuan Huang, *Punishing Repeat Offenders More Severely*, 20 INTERNATIONAL REVIEW OF LAW AND ECONOMICS 127 (2000) (arguing that increasing the punishment of repeat offenders and decreasing the punishment of other offenders could achieve the same level of deterrence, but at the same time reduces the risks of convicting the innocent); Richard Posner, *ECONOMIC ANALYSIS OF LAW* *** (** ed. 2003) (increasing punishment to repeat offenders is justified because the risk of convicting the innocent is lower with regard to them).

³⁸ There are different views on the questions whether in order to achieve optimal deterrence repeat offenders should be punished more severely than other offenders. See Richard A. Posner, *An Economic Theory of the Criminal Law*, 85 COLUM. L. R. (1985), at 1215 ("a repeat offender is usually punished more severely than a first offender even if the repeat offender served in full whatever sentences were imposed for the earlier crimes"); David A. Dana, *Rethinking the Puzzle of Escalating Penalties for Repeat Offenders*, 110 YALE L.J. 733 (2001) (arguing that declining penalties for repeat offenders are optimal since the probability of detection escalates with offence history); Mitchell Polinsky & Daniel Rubinfeld, *A Model of Optimal Fines for Repeat Offenders* 46 J. PUB. ECON. 291 (1991) (arguing that when the penalty is a fine and when the ill-gotten gains of the offenders are not considered part of the social good, it is optimal to punish repeat offenders more severely than other offenders in one type of cases, less severely in another type of cases, and at the same severity in other types of cases); Mitchell Polinsky & Stephen Shavell, *On Offence History and the Theory of Deterrence*, 18 INTERNATIONAL REVIEW OF LAW AND ECONOMICS 305 (1998) (arguing that when the ill-gotten gains of the offenders are considered part of the social good, it is optimal to punish repeat offenders more severely than other offenders); Ariel Rubinstein, *On an Anomaly of the Deterrent Effect of Punishment* 6

Arguably one could object and maintain that it is unlikely that offenders will calibrate their criminal behavior differently under the APP and the DPP. Under this objection, it is not probable that when offenders plan to commit a crime they are sensitive to the amount of evidence the prosecution will be able to collect on the present crime, on past and future crimes, and more importantly on the accumulation of the evidence and its probative value in a future trial.³⁹

This objection fails to consider the fact that repeat offenders are often (although certainly not always) "professionals", while one-time offenders are often (although certainly not always) amateurs.⁴⁰ Being professionals, repeat offenders are likely to be more sophisticated and calculating than other offenders; they are more responsive to sanctions and also more inclined to take "precautions" (or avoidance measures) to reduce the likelihood of conviction.⁴¹ Consequently, repeat offenders, especially the most sophisticated ones, may take advantage of the DPP and try to monitor their criminal activity in such a way that the prosecution could not provide sufficient evidence with respect to each distinct crime. Heads of crime organizations are good example of such repeat offenders. Under the DPP many of them are not even

ECON. LETTERS 89 (1980) (arguing that punishing repeat offenders more harshly increases deterrence of offenders); Thomas J. Miceli & Catherine Bucci, *A Simple Theory of Increasing Penalties for Repeat Offenders*, 1 REVIEW OF LAW AND ECONOMICS 71 (2005) (arguing that repeat offenders should be punished more severely than other offenders, because of their diminished employment opportunities); Winand Emons, *A Note on the Optimal Punishment for Repeat Offenders*, 23 INTERNATIONAL REVIEW OF LAW AND ECONOMICS 253 (2003) (arguing that when punishment is fine, under certain conditions the optimal sanction scheme is decreasing); Winand Emons, *Escalating Penalties for Repeat Offenders*, 27 INTERNATIONAL REVIEW OF LAW AND ECONOMICS 170 (2007) (arguing that under certain condition increasing sanctions for repeat offenders is optimal and under different conditions the opposite is true).

³⁹ Cf Lucian Bebchuk & Louis Kaplow, *Optimal Sanctions When Individuals are Imperfectly Informed About the Probability of Apprehension*, 21 JOURNAL OF LEGAL STUDIES 365 (1992) (discussing optimal enforcement when information regarding probability of apprehension is imperfect).

⁴⁰ Cite.

⁴¹ For optimal enforcement when some individuals are more sophisticated than others, see Lucian Bebchuk & Louis Kaplow, *Optimal Sanctions and Differences in Individuals' Likelihood of Avoiding Detection*, 13 INTERNATIONAL REVIEW OF LAW AND ECONOMICS 13 (1993). **Check** Polinsky and Shavell, *HANDBOOK OF LAW AND ECONOMICS Vol. I*, 439-40 (2007).

brought to trial, let alone convicted. They know very well how to play according to "the rules of the game", and the DPP allows them to do so. It is these kinds of criminals who will be better deterred under the APP.

Another advantage of the APP is its cost-effectiveness. This cost-effectiveness is the result of the fact that the marginal costs of providing evidence targeted to prove a single specified offence increase. Suppose that under the DPP the prosecution should bring ten items of evidence to satisfy the standard of proof for a specific offence. It is typically much harder—and costly—to collect the tenth item of evidence than the ninth item, the eighth item, and so on.⁴² Under the DPP the prosecution should collect all ten items to get a conviction; under the APP, nine items could be more than enough as long as the prosecution could bring one or more items of evidence relating to other offences reasonably attributed to the defendant.

The conjecture that the marginal costs of evidence (targeted to convict a person of a single offence) increase is not always true. Occasionally collecting the tenth item of evidence for a single offence could be less costly than collecting the first item for a different offence.⁴³ But this does not undermine our claim, since the APP gives the prosecution an option: either to collect the tenth item of evidence for the original offence or else collect the first (or more) items for another offence. The prosecution presumably will use this option efficiently and choose the less costly course of action. The prosecution does not have such an option under the DPP.

IV Practical Objections

In this part we discuss several objections to the APP. These objections reflect real concerns that should be taken seriously. Yet, it is shown below that none of the objections provides a reason to reject the APP altogether. The awareness of the force of these objections and the resulting modifications of our proposal contribute to the understanding of the optimal scope of the doctrine.

⁴² Cite.

⁴³ Cite.

A. Manipulations by the Prosecution

Arguably, the use of the APP is bound to lead to a large scale abuse.⁴⁴ After all, it is relatively easy to bring *some* evidence indicating the guilt of any person. Consequently, under the APP, it would be possible to convict any person for some offences without having significant evidence indicating his specific guilt. The prosecution would find it very easy—too easy—to "tailor" accusations and abuse the criminal process. If a person is accused of committing a certain offence and the prosecution fails to prove his guilt beyond reasonable doubt, it could easily collect some evidence suggesting that the person performed a different offence with a low degree of probability and thus overcoming the evidential hurdles for conviction.

This objection is not a reason to reject the APP, but, instead, to design it in a way that will alleviate the concern of manipulation to a minimum. Recall that under the principles of evidence law, a person cannot be convicted on the basis of statistical evidence only.⁴⁵ The APP does not change the rules of evidence. Consequently the APP would bar the conviction of a driver for a violation of traffic regulations just because all drivers commit such violations on a daily basis.⁴⁶ In order to convict a person, case specific evidence should be brought; otherwise conviction would be impossible.

This may not fully alleviate this concern. In particular it does not preclude the possibility of collecting pieces of low probability evidence designed to guarantee a conviction. In order to prevent the abuse of the system by "tailoring" accusations, it is possible to adopt "a minimum threshold" of case-specific evidence standard. Thus, for example, a standard could be set such that only if the prosecution establishes that the probability that the defendant committed the offence attributed to him is more than 50% (which is the preponderance of the evidence standard), then that probability will be aggregated and could be used against the defendant. A minimal threshold of this type would reduce the risks of abuse significantly since the risks of abuse are particularly present when the threshold required for providing evidence is low.

⁴⁴ For the risk of abuse by the prosecution as a consideration in shaping procedural and evidentiary doctrines, *see* (cite). .

⁴⁵ Stein; Kaye (**); Nesson (**); Tribe (**); Jonathan Cohen (**).

⁴⁶ *Cf* Stein (or others): (the blue buses and the stadium examples).

B. More Litigation

Another objection to the APP is that it is expected to trigger massive litigation. This seems to be a natural consequence of the fact that under the APP courts are required to consider even relatively low probability offences in order to determine liability. That would encourage the prosecution—so the objection goes—to bring as much evidence as it can reasonably get with respect to *any* seemingly criminal behavior of the defendant in order to convince the court at the end that the defendant is guilty at least in one offence. It follows therefore that the APP would generate much more litigation and would increase the costs of the criminal law system.

While more litigation is likely to be generated by the APP, we believe it is not a serious concern for two reasons. *First*, if a minimal threshold that precludes courts from aggregating low probabilities offences is adopted, as we suggested above, then the increase in litigation would be mitigated.

Second, even though the APP triggers more litigation, it is likely that the quantity of evidence necessary on average for *one conviction* would decrease under the APP, with a resulting decrease in the volume of litigation *per conviction*. As was explained in Part III, under the APP the costs of collecting evidence for one conviction would be on average lower than under the DPP.⁴⁷ But sometimes it is not only the costs of collecting the evidence which increase but also the quantity of the evidence and the time spent of litigating it. Take the quantity of evidence necessary to convince a court that the probability of guilt is not only 90% but 95%. This quantity is expected to be larger on average than what is necessary to convince a court that the probability of guilt is not only 45% but 50%. The simple intuition here is as follows: since it is more costly, on average, to bring the last item of evidence relating to one offence than the first item of evidence relating to another offence, it is expected that the prosecution, in order to economize on its costs, would try to substitute this costly item with the less costly evidence. *Third*, and most important, it is not frivolous litigation which the APP triggers. On the contrary, more litigation under the APP would result in a correlative increase of justified convictions and better enforcement of the law.

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C. Interdependence of Offences

On many occasions the evidence provided to prove one offence is not independent of the evidence provided to prove another offence. Often such interdependence is hidden, and, consequently, adopting the APP would generate too many false convictions.

To better understand this objection let us return to Example 1. This example assumes that there is no interdependence between the four charges brought against the defendant. Indeed, the easiest case for applying the APP is the one where the actions attributed to the defendant are independent of each other, as well as the evidence relating to each of these actions. When the offences are not independent, a simple aggregation of the probabilities will result in too many false convictions. Suppose for example that someone is accused of four separate offences of sexual assaults, all committed against the same victim. In each case, if examined separately, the evidence indicates a probability of .9 that the defendant is guilty.

Assume now that there is a probability of .1—which is sufficient for acquittal—that the victim fabricated one accusation against the defendant in order to retaliate against him.⁴⁸ Obviously the probabilities that the four offenses were committed are interdependent: if the victim plotted against the defendant with respect to one offence she would be more likely to have done it a second time and a third time, and so forth. In other words, if she plotted against the defendant with respect to one offence, it significantly increases the chances that she did it with respect to other offences. This is not to say that under certain circumstances the evidence with respect to all four charges could not convince the court that at least one offence, and even more, was committed by the defendant; but courts should be very cautious in such cases in aggregating the probabilities.

In the sexual assault example the interdependence is obvious and courts are expected therefore to take it into account. But, at other times, the interdependence is hidden, and, consequently the risk of too many false convictions is even more substantial given that courts may be oblivious to it.

Suppose a driver is detected five times for speeding by the same radar, and that the radar's average rate of error is .75. Assume now that the radar's rate of error is much larger in the evenings than in the mornings, say, because it is calibrated every

⁴⁸ Cite cases.

night, and, assume also, that the rate of error is especially high with respect to bright color cars. If our driver was detected five times in the evenings and his car was of a bright color, and assuming the court is unaware of the radar's defects, aggregating the probabilities could create too high risk of false convictions.

We don't think that the risk of hidden interdependence provides a conclusive reason to reject the APP. Instead, courts should be aware of it and require sufficient evidence to rebut its existence before applying the APP. Furthermore, given awareness to the problem of hidden interdependence, the APP, if adopted, would trigger research and generate information concerning the possible interdependence.⁴⁹

D. Difficulties of Implementation

Applying the APP could be hard. Courts could make mistakes and apply it wrongly. One possible mistake was discussed in the previous section: a court could aggregate interdependent probabilities as if they were independent ones. But even without that, applying the APP presupposes courts' knowledge of the probabilities relating to each offence, while in fact courts do not possess such knowledge. To be sure, under the DPP courts should be able to judge whether the standard of "beyond a reasonable doubt" was satisfied or not, and their judgment has at least some probabilistic feature;⁵⁰ but they are not required to ascribe *accurate* probabilities to their finding on that matter. Finally, applying the APP across trials is even harder. Here the court of trial B should get accurate information about the probability of the defendant's guilt in Trial A, either if the defendant was convicted at Trial A or acquitted. This puts an unreasonable burden on both courts A and B.

This objection is a convincing one as long as it relates to aggregating probabilities across different trials. But it should not be a reason not to apply the APP across different offences in the same trial. Indeed, a court which applies the APP should look also at the "general picture", namely at all charges, and not only at each offence separately. The court is not required under the APP to ascribe precise probabilities to each offence.

To establish what the APP requires of courts, compare it to the DPP. Under the DPP courts are asked to examine whether there is sufficient evidence that the

⁴⁹ Sometimes new legal rules or principles trigger a market for information necessary to implement them. Cite.

⁵⁰ *Supra.*

defendant committed offence A, or sufficient evidence that he committed offence B or sufficient evidence that he committed offence C and convict the person of one of these offences only if there is sufficient evidence that this particular offence was committed. In contrast under the APP the court should address the question whether there is sufficient evidence that the defendant committed one of these three offences.⁵¹ Thus, under the APP a court could conclude in a certain trial, that even though it cannot convict the defendant for the commission of any *specific* offence, it can convict him of the commission of one *indeterminate* offence (or more) because there is no reasonable doubt that he committed one offence (or more).

E. Redundancy

Last, it could be argued that the APP is already being used by courts even if only implicitly and there is no need to recognize it explicitly. Moreover, if courts apply it implicitly, forcing them to apply it explicitly may result in double counting. According to this objection, when several charges are made against the defendant, the judge, and certainly the jury are influenced by the accumulation of the charges and tend to convict more easily than if there was only one charge.

It is hard to tell whether the assumption that courts and jury are influenced by the accumulation of charges is empirically right or wrong.⁵² At least with respect to judges, it may be the case that judges are committed to examine each charge separately and not to be influenced by the plurality of charges. The prevailing legal ethos does not allow considerations of the type examined above. To the extent that judges inculcate this ethos, it follows that judges are likely to consciously reject the very possibility of aggregating probabilities.

But even if sometimes courts really apply a rule which is similar to the APP, it is better to do so explicitly and systematically, rather than implicitly and randomly.

⁵¹ A similar argument as the one discussed here is sometimes raised against applying the Hand Formula, which arguable requires courts to calculate expected damages and costs of precaution. Cite. However, for applying the Hand Formula it is enough for a court to determine whether the marginal expected damages is higher or lower than the marginal costs of precaution, and it should not make any accurate calculation of those figures. *See* Cooter and Ulen; Posner; Shavel. Cite. *See also* Ariel Porat, Offsetting Risks, 106 Michigan. L. Rev. 243, 272-3(2007) (explaining how probabilistic rules can be applied with rough, rather than accurate, information about probabilities).

⁵² Cite?

Furthermore, the application of the APP could sometimes be complicated and hard, and it is better to deal with it in a straightforward way instead of leaving it to judges and jurors' rough and sometimes inconsistent intuitions.

Even if judges do not apply the APP, it is possible that police and prosecution apply a version of the APP in making decisions to bring defendants to trial and to enforce the law. According to this argument, when the police and prosecution get evidence related to different offences allegedly committed by the same person, they are more likely to bring him to trial,⁵³ and more importantly, they try harder to collect more evidence thereby increasing the chances of conviction.⁵⁴

Even though we believe that the APP may already be used by the police and prosecution, we do not think this is a reason for courts not to apply the APP. *First*, if courts refuse to apply the APP it certainly influences the prosecution's decisions *not* to charge suspects even if by aggregating the probabilities they are convinced that a specific person is guilty of an offence. Under such a scheme, the prosecutors know that as long as they are unable to establish that the defendant committed a specific offence the court will apply the DPP and acquit the defendant. *Second*, even if the police and prosecution increase their enforcement efforts directed at a person against whom there is enough evidence for conviction under the APP but not under the DPP, it is not clear why courts should not apply the APP. By refusing to adopt the APP, courts encourage the prosecution to incur excessive costs for enforcement;⁵⁵ furthermore, on many occasions the police and prosecution will not bring sufficient evidence for conviction under the DPP even if under the APP conviction is warranted—either because the costs of collecting more evidence is prohibitively high, or because such evidence is impossible to collect.

Finally, it could be argued that at least in plea bargains the APP is in fact applied: when there are several accusations against the defendant, and even when none of them passes the threshold necessary for convictions, the aggregation of the probabilities would influence the bargain between the prosecution and the

⁵³ Cite?

⁵⁴ Check David Dana's paper on three strikes laws, explaining that people with criminal records are subject to higher level of enforcement.

⁵⁵ Supra.

defendant.⁵⁶ Even if that is right, we do not see why courts should not apply the APP. As we have already explained in the previous paragraph, the prosecution acts in the shadow of the prospective trial. Therefore, if the APP is not applied by courts, it certainly affects plea bargains, though *not* in the right direction. Furthermore, even if the APP was perfectly applied through pleas bargains, still it provides no reason why it should not be applied by courts as well.

V Retributivist and Expressivist Theories of Punishment

So far, we have established that deterrence-based theories, in particular theories which focus on efficiency, would probably endorse a moderate version of APP. It is time now to examine justice-based theories. Our primary claim is that different justice-based theories of punishment may endorse different views concerning the APP. To do so we discuss two types of justice-based theories: Kantian theories and expressivist theories of punishment. We argue that the former type of theory is likely to be more sympathetic to the APP than the latter.

Kant maintains that, "[p]unishment by a court . . . can never be inflicted merely as a means to promote some other good for the criminal himself or for civil society. It must always be inflicted upon him only *because he has committed a crime*."⁵⁷ This observation provides the basis for many retributivist theories. The basic observation maintained by retributivists is that wrongdoers ought to be made to suffer in proportion to their offence.⁵⁸ Criminals, under this view, simply deserve to be punished and, furthermore, their desert provides reasons to inflict punishment upon them. As Thomas Hill explains, this view implies that "acts of a certain kind have as an intrinsic property that it is *fit, appropriate or called for that the perpetrator suffer for it*".⁵⁹ Hence, if we establish that an agent performed a wrong, we have a reason to inflict a sanction on that person even if the nature of the wrong is left unspecified since the person clearly deserves to be punished.

⁵⁶ Cf Henrik Lando ***.

⁵⁷ Immanuel Kant *The Metaphysics of Morals* 6: 331 (Cambridge University Press, ed. Mary Gregor, 1996).

⁵⁸ See, e.g., Thomas E. Hill, *Kant on Wrongdoing, Desert and Punishment* 18 *Law and Philosophy* 407, 409 (1999).

⁵⁹ *Id.* at 425.

In contrast expressivists emphasize expressive, educational and communicative aspects of criminal sanctions ("EEC theories"). Under such views sanctioning a person is a public manifestation of condemnation and disapprobation of his deeds. Some believe that condemnation and disapprobation is sufficient in itself to justify the infliction of criminal sanctions (expressive theories) while others believe that condemnation and disapprobation are conducive to other goals such as education or the inducement of guilt.

Robert Nozick falls into the former camp. Nozick believes that "[r]etributive punishment is an act of communicative behavior."⁶⁰ In elaborating on the concept of communicative behavior, Nozick speaks of retributive principles as encompassing two aspects. The first is to "connect the wrongdoer to value qua value" and the second is to connect it in a way "that the value qua value has a significant effect in . . . [the criminal's] life, as significant as his own flouting of correct values."⁶¹ Similarly Joel Feinberg believes that: "punishment is a conventional device for the expression of attitudes, resentment and indignation, and of judgments of disapproval and reprobation, on the part either of the punishing authority himself or of those 'in whose name' the punishment is inflicted."⁶² Jean Hampton shifts attention to educational concerns. In her view, "punishment is intended as a way of teaching the wrongdoer that the action she did (or wants to do) is forbidden because it is morally wrong and should not be done for that reason."⁶³

Although EEC theories do not have to reject the APP, they seem likely to do so. After all, these theories highlight the condemnation or disapproval of *an act*, and it is a prerequisite for conveyance of condemnation and disapproval of an act to identify the object of condemnation and disapproval, that is, to identify unambiguously the act that it being condemned.⁶⁴ Punishing a person for *an* offence she may or may not have

⁶⁰ Robert Nozick, *Philosophical Explanations* 370 (Harvard University Press, 1981)

⁶¹ *Id* at 376.

⁶² See Joel Feinberg, *The Expressive Function of Punishment* in Duff & Garland at 74.

⁶³ Jean Hampton, *The Moral Education Theory of Punishment* 13 *Philosophy and Public Affairs* 208, 212 (1984)

⁶⁴ It is possible of course to develop an expressivist theory which focuses on the condemnation of the character of the actor or culpability of the actor rather than condemnation of the acts performed by him. Such a theory may be developed but this is not the route taken by traditional expressivist theories of punishment. For character-based theories of punishment, *see*

committed (simply because it is evident that she committed either this offence or a more serious one) rather than for *the* offence she committed dilutes the important expressive, educational or communicative message that the deed performed by the person is wrong. Hence, the APP would probably be rejected (or at least unlimited version of the APP) because no specific act can be attributed to the individual and, consequently, no act can be effectively condemned. To condemn a person for a bad deed he committed or to condemn a person for an act which forms part of a disjunction of acts is not to condemn a specific act. It is instead closer to condemnation of the person as such for having done a bad deed than a condemnation of an act.

The rejection of the APP by the expressivist theorists is not an accident. It is based on the way these theories address what seems to be an evident weakness of these theories. Expressivist, educational and communicative theories are always open to the accusation that to condemn theft, rape or murder, it is not necessary to inflict sanctions on the perpetrator.⁶⁵ To address this objection, these theories claim that punishment is a special mode of expression—one that is concrete rather than abstract; one that is designed to express disapproval of a particular act that was performed by the perpetrator rather than towards an evil act which may or may not have committed by him. Evidence for this requirement for specificity is ample in these theories. Hence, for instance, according to Hampton, the punisher needs "to communicate to the wrongdoer that *her* victims suffered . . . so that the wrongdoer can appreciate the harmfulness of her action."⁶⁶ Feinberg also asserts that "punishment surely expresses the community's strong *disapproval* of what the criminal did."⁶⁷ Communicating disapproval by punishing an individual for a disjunction of acts does not satisfy the specificity of expression required by these theories.

Advocates of the APP could dispute this claim and argue that by endorsing the APP, punishment conveys a disapproval of *all offences* which constitute the disjunction. Arguably, the conviction in such cases can be based only on disapproval and condemnation of *all* offences included in the disjunction because without such a global condemnation, the person must be acquitted. Thus, ironically it seems that the

⁶⁵ See, e.g., Feinberg 87; Hampton 161.

⁶⁶ Hampton, 162

⁶⁷ Feinberg, 76.

APP is even more effective in expressing or conveying disapproval than the DPP because it conveys the message that *all* the offences included in the disjunction are wrong.

This objection fails to appreciate the subtlety of the concerns raised by expressivist, educational and communicative theories. It fails to capture the significance of the condemnation of a concrete act—the very act that has been perpetrated by the criminal—rather than the condemnation of hypothetical components of a disjunction some of which may not have been committed by the agent. Concrete condemnation is condemnation which stresses the hideousness of an actual act performed by the defendant: murder, rape, theft or fraud rather than merely a crime deserving a sentence of at least ten years such as murder *or* rape *or* theft *or* fraud or even the condemnation of both robbery and murder when only one can be attributed to the perpetrator.

To sum up, different justice-based theories take different attitudes towards the APP. While traditional retributivist theories are likely to be sympathetic to the APP, expressivist theories are likely to be more suspicious towards it. Perhaps this fact explains the intuitive reluctance on the part of criminal law theorists and practitioners to implement it in practice.

When, if ever, should the APP be recognized and give rise to a conviction? Under retributivism (as described above) the answer is that APP should be applied with no limits. In contrast, under EEC theories the answer is more delicate. It depends on the question of whether using the APP will effectively serve the expressive, educational and communicative functions of criminal law. We shall argue that the more similar two offences are, the more likely the APP can be used without frustrating the expressive, educational and communicative functions attributed by theorists to criminal law. In contrast the more different the offences are, the greater the willingness of advocates of these theories to use the DPP.

As a start let us examine the *nature of the offence*. To establish the relevance of the nature of the offence, assume that it can be proven beyond a reasonable doubt that a person committed either a murder or a theft but it cannot be established that he committed any one of them.⁶⁸ The fact that the offences are so different and that one

⁶⁸ To illustrate, assume that there is a probability of .9 that the defendant committed murder and a probability of .9 that in a different occasion he committed theft, and that there is no correlation

is classified as an offence against the body while the other is classified as a property offence seems sufficient to substantiate the conclusion that the person ought not to be convicted. The concern in this case is a concern that has been acknowledged by some writers as the concern for “fair labeling.” The concern for fair labeling is the concern that “offenders ought to be labeled with an adequate degree of precision, in order that the criminal record identifies the gist of . . . [the offender’s] criminal wrongdoing.”⁶⁹

It would also seem implausible under EEC theories to convict a person who committed one of two unrelated fraud offences. If the police can prove that a defendant committed either a fraud on one occasion or an unrelated fraud committed on another occasion, the defendant, most likely, should be acquitted. This case establishes the relevance of a second important dimension for EEC theories: *the homogeneity or heterogeneity* of the offences. The two offences are classified as fraud offences. But, despite their formal similarity, no two fraud offences are identical. The nature and severity of fraud offences is always colored by the particular circumstances: the sum of money, the identity of the victim, and so forth. Heterogeneity makes it more difficult to express concrete condemnation of the act performed by the defendant since the disjunction of the offences consists of very different actions.

Yet, there are circumstances under which the heterogeneity of the circumstances should not bar conviction under the expressive, educational and communicative theories. Assume that two bank officials have committed a series of (unrelated) frauds against a single bank at the same period. It can be proven beyond reasonable doubt that one official has committed a series of frauds against the bank and stole \$100,000, while the second official committed a series of frauds against the bank and stole \$200,000, but it cannot be established who committed each one of the series of frauds. It seems in this case that the *similarity in the circumstances* is sufficient to make the condemnation of both offenders concrete enough and to convey a clear and concrete disapproval of the behavior. A dimension which seems to be relevant in this case is the *identity of the victim of the offence*. If it can be established

between the probabilities. In this case the probability that the defendant committed either murder or theft is .99. Assuming for example that .95 is considered by the law to be sufficient for conviction the question is whether to convict the defendant by applying the APP.

⁶⁹ See A P. Simester & G R Sullivan On the Nature and Rationale of Property Offences in R.A. Duff & Stuart Green, *Defining Crimes* 186 (2005).

that several offences were committed against a particular victim, and, in addition, it can be established that the circumstances under which they were committed were identical, then EEC theories could endorse the use of the APP even if it cannot be established which was exactly the offence committed by the defendant.

Conclusion

This paper raises a challenge to a prevailing practice governing criminal law. While all theorists and practitioners reject the use of the APP, deterrence-based considerations support its adoption. Although practicalities may limit the optimal scope of the APP, a moderate version of the APP can promote deterrence and be immune to abuse. We have also observed that justice-based considerations endorse different views concerning the APP. The retributivist theories would endorse aggregation across offences while expressivist theories would be less inclined to do so. Expressivist concerns suggest that the sentence should reflect a disapproval of an act and that that act should be identified such that disapproval of it would be sufficiently concrete. It is perhaps the expressivist concerns which explain why the APP is universally rejected by criminal law theorists and practitioners. These concerns could also explain why in cases where deterrence seems to be the underlying theory—such as in regulatory offences—the APP has greater appeal than in other cases.

This paper is ultimately the byproduct of an enigma. It is founded on an observation that the practice of law seems to reject offhand and categorically what simple and common-sense reason seems to endorse categorically, namely the APP. While in general the practice of law is wiser than theorists can imagine, it may sometimes err in its judgments. We believe that this is one of these rare cases and consequently we believe that the practice of law should endorse (in a limited way) the APP. The scope of endorsement is constrained by both practical limitations as well on principled expressivist concerns.

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